

Nov. 17, 1942.

H. KLAMMROTH

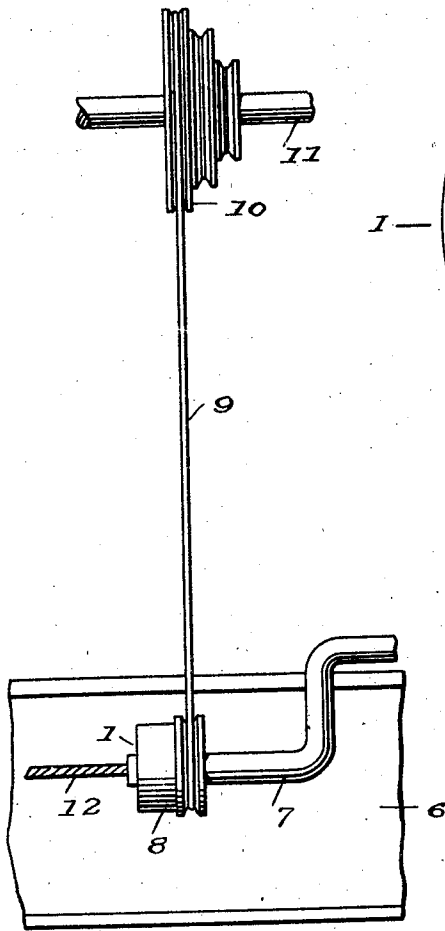
2,302,555

PROCESS AND APPARATUS FOR MAKING ARTIFICIAL THREAD-LIKE PRODUCTS

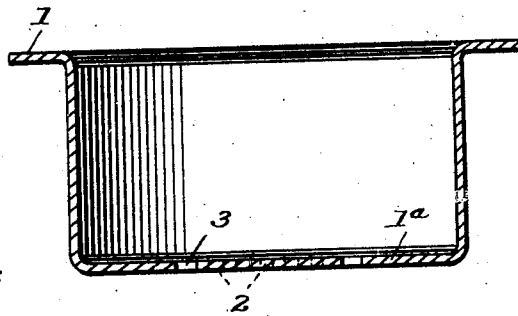
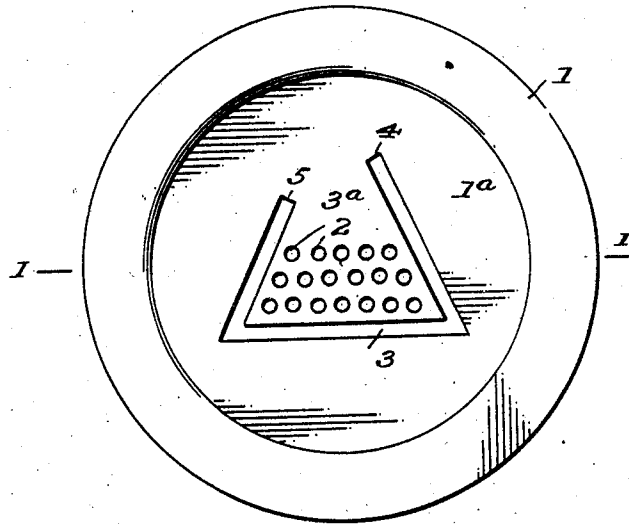
Filed July 18, 1940

2 Sheets-Sheet 1

*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

Inventor  
HANS KLAMMROTH

By *Rudolph J. Bley*

Attorney

Nov. 17, 1942.

H. KLAMMROTH

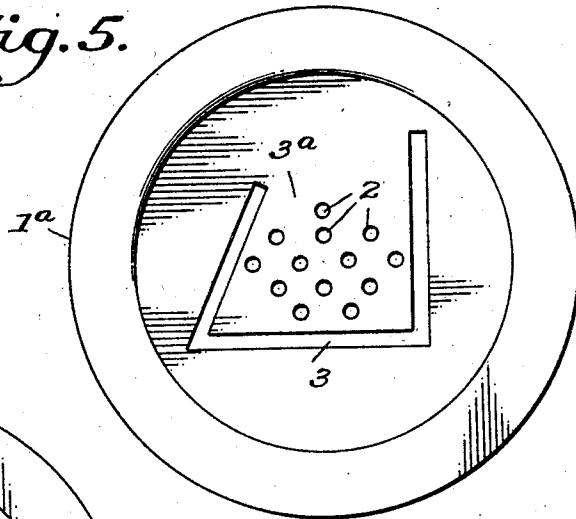
2,302,555

PROCESS AND APPARATUS FOR MAKING ARTIFICIAL THREAD-LIKE PRODUCTS

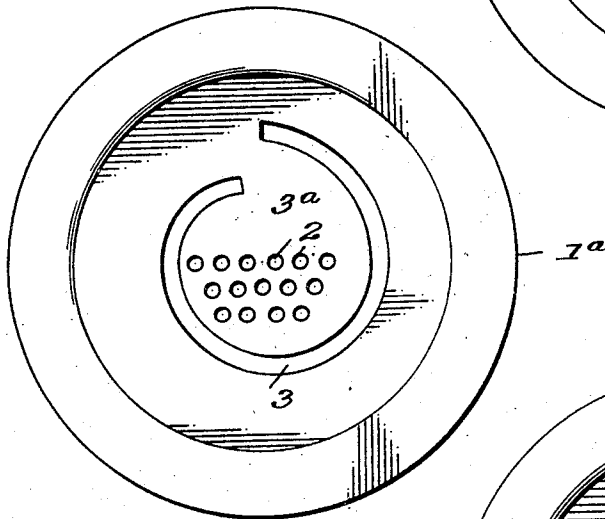
Filed July 18, 1940

2 Sheets-Sheet 2

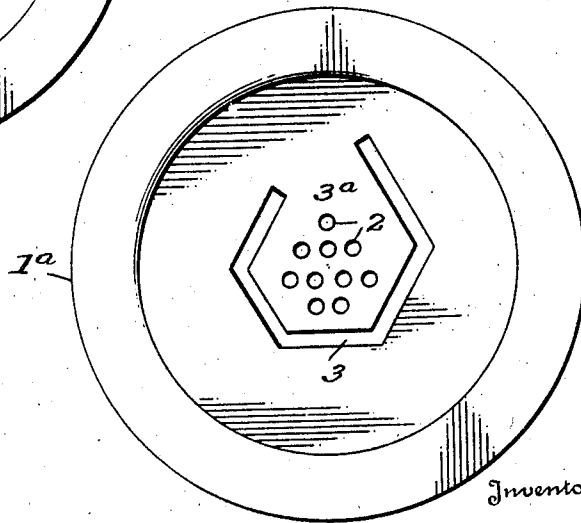
*Fig. 5.*



*Fig. 4.*



*Fig. 6.*



Inventor

HANS KLAMMROTH

By *Rudolph S. Beer*

Attorney

# UNITED STATES PATENT OFFICE

2,302,555

## PROCESS AND APPARATUS FOR MAKING ARTIFICIAL THREADLIKE PRODUCTS

Hans Klammroth, Heinsberg, Rhineland, Germany, assignor to North American Rayon Corporation, New York, N. Y., a corporation of Delaware

Application July 18, 1940, Serial No. 346,234  
In Germany August 26, 1939

10 Claims. (Cl. 18—8)

The present invention relates to the manufacture of textile yarn, and more particularly refers to the spinning of a novel thread-like product of artificial origin comprising a plurality of continuous filaments and a ribbon-like product.

The thread-like product contemplated by the present invention is widely used in various branches of the industry; particularly great demand for it exists in the hat and trimming ware industries. It consists of a bundle of continuous filaments which are surrounded and held together by a flat, ribbon-like product in tubular form.

In accordance with the methods heretofore employed in the manufacture of this thread-like product, it was necessary to produce the filament body in one operation and the ribbon in a separate operation. The thread and ribbon thus formed were then subjected to a twisting operation in order to obtain the final product. It is apparent that owing to these various manipulations heretofore required, the manufacturing costs for this particular textile product were excessively high.

In contradistinction to the known methods it is the primary aim and object of the present invention to combine the conventional operating steps and thus produce the thread-like product in one single operation.

Another object of the present invention is to provide a method and apparatus for the manufacture of the thread-like product in a continuous operation and in a more expeditious manner.

Still another object of the present invention is to provide a simple method and apparatus whereby the specific thread-like product is manufactured with greater economy.

Further novel features of improvement will be perceived and readily understood from a study of the following description of an illustrative embodiment of the invention in connection with the accompanying drawings, in which

Fig. 1 is an enlarged plan view of a spinning nozzle showing the arrangement of the orifices and of the slot-like opening in the draw plate through which the filaments and the ribbon are extruded;

Fig. 2 is an enlarged vertical cross-sectional view of the spinning nozzle taken along lines I—I of Fig. 1; and

Fig. 3 is a side elevation of a part of a standard spinning machine showing the device of the invention in operative position.

Figs. 4, 5 and 6 are modifications of the ar-

5 rangement of the orifices and of the slot-like opening in the draw plate of the spinnerette.

In the drawings, in which like numerals of reference indicate like parts, 1 refers to a conventional cup-shaped spinning nozzle which is extensively used in the artificial silk industry. The draw plate 1a of the spinning nozzle 1 is provided with a plurality of minute orifices 2 positioned substantially in the center portion of the draw plate 1a through which a spinning solution is extruded into a precipitating medium adapted to coagulate the extruded filament bundle.

The draw plate 1a is further provided with a slot-like opening 3. This opening is arranged in the draw plate in a manner which substantially surrounds the orifices 2, and may be of spiral, semi-circular, arch-like, trapezoid or any other shape as shown in Figures 4, 5, and 6. In Fig. 1 of the drawings the slot is shown substantially in the form of a triangle but having only two angles. For a purpose later discussed in this specification, the slot 3 is preferably constructed in such a manner that one end thereof extends beyond the point of termination of the opposite end, which may be achieved by having one end of the slot terminate a greater distance away from the center point of the spinnerette draw plate than the opposite end. As illustrated in the drawings, the side 4 is longer than the side 5, and thus extends beyond the termination point of the latter, calculated from the center point of the spinnerette draw plate. 3a indicates a space in the draw plate which is not obstructed by the slot 3. The passage way thus created between the sides 4 and 5 of the slot 3 is necessary in order to allow the precipitating medium to pass therethrough and to contact and coagulate the filaments extruded through the orifices 2 within the slot 3.

The slot 3 serves for the extrusion of the spinning solution producing the ribbon-like product which substantially surrounds the filaments extruded through the orifices 2. The ribbon and the filament bundle are simultaneously extruded into a precipitating medium and are then after-treated in the usual manner and finally subjected to a drying operation which is preferably carried out under tension. This drying process under tension has a favorable effect upon the formed thread-like product in that it causes the tubular ribbon to hold the filament body more firmly within its confines. Also, the ribbon and thread may be stretched immediately after extrusion by the spinnerette. In this event the ends of the

ribbon formed by the sides 4 and 5 of the slot 3 will roll inwardly and thus form the ribbon into a practically tube-like product which more or less completely surrounds the filaments extruded through the orifices 2.

Another preferred form of winding the ribbon around the thread body simultaneously with the spinning thereof may be achieved by means of rotating the spinnerette during the spinning process. An illustrative embodiment for carrying out this process when used in conjunction with the viscose process of manufacturing artificial silk threads is shown in Fig. 3 of the drawings. Immersed in a spinning bath trough 6 is a spinning pipe 7 through which the spinning solution is supplied to the spinnerette. A coupling 8 which carries the spinnerette 1 is rotatably supported at the end of the spinning pipe 7. The coupling 8 together with the spinnerette are rotated by the rope 9 which is driven by a grooved pulley 10 supported on drive shaft 11. 12 indicates the combined thread and ribbon-product extruded through the spinnerette 1 into a precipitating medium contained in the trough 6.

The operation of the device just described is as follows. The shaft 11 which is driven by a motor or any other driving means not shown in the drawings, rotates the grooved pulley 10 which by means of the rope 9 engages the coupling 8 rotatably supported on the pipe 7 and rotates it in clockwise direction. The spinnerette 1 securely supported by the coupling 8 is thus rotated simultaneously therewith. The spinning solution is supplied through the pipe 7 and is extruded through the spinnerette 1 into a precipitating bath contained in the trough 6. As has been pointed out earlier in this specification, the slot 3 in the draw plate 1a of the spinnerette 1 is formed in such a manner that one side thereof terminates somewhat beyond the point of termination of the opposite side, as shown in the drawings at 4. Upon rotation of the spinnerette in clockwise direction the slot 3 will be wound helically around the thread body extruded through the orifices 2, and the novel structure of the slot 3, as pointed out above, will cause the extruded ribbon to be wound around the thread body in a manner whereby one side of the ribbon will be continuously laid upon and overlap a preceding portion of the opposite side of the ribbon as the spinnerette rotates. With reference to Fig. 1 of the drawings, the side 4 of the slot 3 produces that portion of the ribbon which partially overlaps the helical turns of the ribbon portion formed by the side 5. These helical windings of the ribbon result in a tube-like product which completely encircles the thread body at all points.

The rotation of the spinnerette may be carried out in any well known manner. The arrangement shown in the drawings merely represents an illustrative example of an apparatus capable of utilization in carrying out the invention disclosed herein. The device described in this application may be advantageously employed since it has been found that best results are obtained if the spinnerette is rotated at a comparatively slow speed. Speeds of the spinnerette of from 10 to 20 revolutions per meter of extruded spinning solution have been found to be most suitable.

The advantages of this invention are clearly apparent. By using the device illustrated in the accompanying drawings and described in the

foregoing specification, it is made possible to manufacture in one single operation a thread-like product consisting of a thread body and a ribbon surrounding the thread body. The thread-like product which has thus been produced in a very unique and simple manner and with the greatest economy of production possesses very uniform textile properties.

While the invention may be used in the manufacture of any type of synthetic fibers, regardless of their chemical origin, it offers special advantages in the manufacture of rayon products such as those made from, for example, cellulose regenerated from cuprammonium or viscose solutions, which may also contain proteins or other ingredients, cellulose derivatives, etc. Examples of other synthetic fibers are vinyl and vinylidene polymers, polyamides, etc. These synthetic fibers may be either dry-spun or wet-spun.

It will be apparent to those skilled in the art that many variations of this process and apparatus may be made without departing from the spirit and scope of the present invention, and it is intended to cover all variations coming within the scope of the appended claims.

I claim:

1. An apparatus of the class set forth, in combination, a precipitating medium, a tubular means partially immersed in said precipitating medium for supplying a spinning solution, annular means rotatably supported at the end of the supply means immersed in said precipitating medium, a spinnerette rigidly supported by said annular means for rotation therewith and adapted to receive the spinning solution, said spinnerette having a draw plate containing a plurality of orifices and a slot-like opening substantially surrounding said orifices for the extrusion of the spinning solution into said precipitating medium, and means to rotate said annular means and said spinnerette at speeds from about 10 to 20 revolutions per meter of extruded spinning solution.

2. A spinnerette for the manufacture of composite synthetic products having a plurality of substantially circular orifices therein, said orifices being incompletely surrounded by a continuous slot-like orifice.

3. A spinnerette for the manufacture of composite synthetic products having a plurality of substantially circular orifices therein, said orifices being incompletely surrounded by a continuous slot-like orifice, and said slot-like orifice having a curvilinear shape.

4. A spinnerette for the manufacture of composite synthetic products having a plurality of substantially circular orifices therein, said orifices being incompletely surrounded by a continuous slot-like orifice, one end of which is located at a greater distance from the center point of said spinnerette than the other end thereof.

5. A spinnerette for the manufacture of composite synthetic products having a plurality of substantially circular orifices therein, said orifices being incompletely surrounded by a continuous, triangular, slot-like orifice, one end of which is located at a greater distance from the center point of said spinnerette than the other end thereof.

6. In a process for the manufacture of a composite synthetic product, the steps which comprise extruding a spinning solution through a plurality of circular orifices of a spinning nozzle to form a multifilament thread, and simultane-

ously extruding said spinning solution through a slot-like orifice in said spinning nozzle to form a sheath substantially enclosing said thread longitudinally, said slot-like orifice substantially surrounding said circular orifices.

7. In a process for the manufacture of a composite synthetic product, the steps which comprise extruding a spinning solution through a plurality of circular orifices of a revolving spinning nozzle to form a multifilament thread, and simultaneously extruding said spinning solution through a slot-like orifice in said spinning nozzle to form a sheath substantially enclosing said thread longitudinally, said slot-like orifice substantially surrounding said circular orifices.

8. In a process for the manufacture of a composite synthetic product, the steps which comprise extruding a viscose spinning solution through a plurality of circular orifices of a spinning nozzle to form a multifilament thread, and simultaneously extruding said spinning solution through a slot-like orifice in said spinning nozzle

to form a sheath substantially enclosing said thread longitudinally, said slot-like orifice substantially surrounding said circular orifices.

9. In a process for the manufacture of a composite synthetic product, the steps which comprise extruding a viscose spinning solution through a plurality of circular orifices of a revolving spinning nozzle to form a multifilament thread, and simultaneously extruding said spinning solution through a slot-like orifice in said spinning nozzle to form a sheath substantially enclosing said thread longitudinally, said slot-like orifice substantially surrounding said circular orifices.

10. A spinnerette for the manufacture of composite synthetic products having a plurality of substantially circular orifices therein, said orifices being incompletely surrounded by a continuous slot-like orifice, and said slot-like orifice having an angular shape.

HANS KLAMMROTH.